

FCC Part 24 Compliance Test Report

Test Report no.:	Cph_FCC_0814_12.doc	Date of Report:	03-Apr.-2008
Number of pages:	17	Customer's Contact person:	Ole Soerensen
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FCC listing no.:	99059		
IC recognition no.:	661AD-1		
Tested devices/ accessories:	Phone RM-451 / Battery BL-4U, AC-Charger AC-6E and Headset HS-82		
FCC ID:	QTKRM-451	IC:	661AD-RM451
Supplement reports:	The test results in this Test Report are copied from the RM-233 Test Report No.: Cph_FCC_0731_08		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 24, TIA-603-C-2004 and IC standard RSS-133 (Issue 4, February 2008). Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test Results:	The EUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document.		
Date and signature for the contents:			

Allan F. Henriksen, Manager

1. Summary for FCC Part 24 Compliance Test Report

Date of receipt	31-07-2007
Testing completed	06-08-2007
The customer's contact person	Ole Soerensen
Test Plan referred to	T:\Projects\RM-451\TestPlan_RS\RS_test_plan_RM-451.xls
Notes	None
Document name	T:\Projects\RM-451\EMC\Results\FCC\Cph_FCC_0814_12.doc

1.1. EUT and Accessory Information

The EUT is a 3-band (GSM900/1800/1900) mobile phone with GPRS, EGPRS and Bluetooth.
The EUT is tested with maximum rated TX power, modulated with pseudo random bit sequence (PRBS9).

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-233	004401/01/058423/9	0310	-	07w15_07_w30	29209
Phone	RM-233	004401/01/058427/0	0310	-	07w15_07_w30	27212
Battery	BL-4U	4181577185111401106;0070560	-	-	-	29210
Battery	BL-4U	4181577185111401107;0670560	-	-	-	27213
AC-Charger	AC-6E	3943497014200300650;0675590	1.0	1.0	-	27210
Headset	HS-82	0037	0.9	0.6	0.5	27240

1.2. Summary of Test Results

GSM 1900:

Section in CFR 47	Section in RSS-133	Name of the test	Result
§2.1046(a)	6.2	Conducted RF output power	NP
§24.232(b)	6.2	Radiated RF output power	Passed
§2.1049(h)	5.6	99 % occupied bandwidth	NP
§24.238(a)	6.3	Band edge compliance	Passed
§24.238(a), §2.1051	6.3	Spurious emissions at antenna terminals	NP
§24.238(a), §2.1053	6.3	Spurious radiated emissions	Passed
§2.1055(a)	7	Frequency stability, temperature variation	Passed
§2.1055(d)	7	Frequency stability, voltage variation	NP

PASSED

FAILED

NP

The EUT complies with the essential requirements in the standard.

The EUT does not comply with the essential requirements in the standard.

The test was not performed by the TCC Nokia Copenhagen Laboratory.

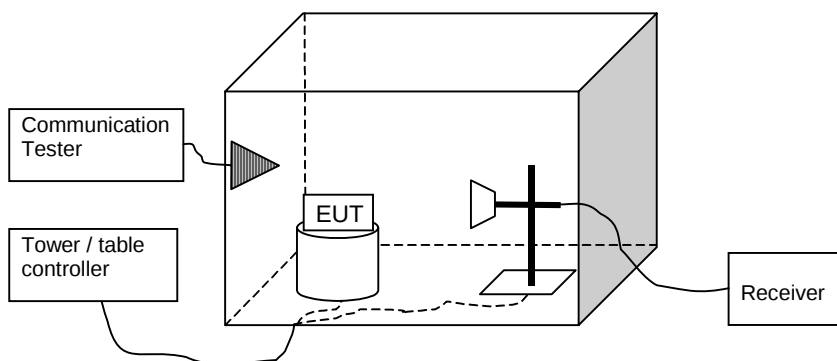
CONTENTS

1. Summary for FCC Part 24 Compliance Test Report	2
1.1. EUT and Accessory Information	2
1.2. Summary of Test Results	2
2. Radiated RF output power (FCC §24.232(b), RSS-133 6.2)	4
2.1. Test setup	4
2.2. Test method and limit	4
2.3. GSM 1900 Test results	5
3. Band edge compliance (FCC 24.238(a), RSS-133 6.3)	7
3.1. Test setup	7
3.2. Test method and limit	7
3.3. GSM 1900 Test results	8
4. Spurious radiated emissions (FCC §24.238(a), §2.1053, RSS-133 6.3)	12
4.1. Test setup	12
4.2. Test method and limit	12
4.3. GSM 1900 Test results	13
5. Frequency stability, temperature variation (FCC §2.1055(a), RSS-133 7)	14
5.1. Test setup	14
5.2. Test method and limit	14
5.3. GSM 1900 Test results	15
6. Test Equipment	16
6.1. Conducted measurements	16
6.2. Radiated measurements	16

2. Radiated RF output power (FCC §24.232(b), RSS-133 6.2)

EUT with DUT number	RM-233, DUT 27322
Accessories with DUT numbers	BL-4U, DUT 29210; AC-6E, DUT 27210
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 45 / 100.3
Date of measurements	01.08.2008-03.08.2008
Measured by	Kalle Hannila / Ruben Hansen

2.1. Test setup



2.2. Test method and limit

The measurement is made according to TIA-603-B-2002 as follows:

The measurement is performed in the Anechoic Chamber with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system. The turntable is rotated 360 degrees and this is repeated for both horizontal and vertical receive antenna polarizations.

The EUT is placed on a nonconductive plate at 170 cm height.

The substitution method is used. Substitution values at each frequencies are measured beforehand and saved to the test software.

The substitution corrections are obtained as described below:

$$A_{SUBST} = P_{SUBST_TX} - P_{SUBST_RX} - L_{SUBST_CABLES} + G_{SUBST_TX_ANT}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain. P_{SUBST_TX} is signal generator level, P_{SUBST_RX} is receiver level, L_{SUBST_CABLES} is cable losses including both TX and RX cables and $G_{SUBST_TX_ANT}$ is substitution antenna gain.

The measurement results are obtained as described below:

$$P [dBm] = P_{MEAS} + A_{TOT}$$

Where P_{MEAS} is receiver reading in dBm and A_{TOT} is total correction factor including cable loss and substitution correction ($A_{TOT} = L_{CABLES} + A_{SUBST}$).

Limits for radiated RF output power measurements

Frequency range [MHz]	Limit [W]	Limit [dBm]
1850 - 1910	2	33

2.3. GSM 1900 Test results

Slide Open:

GSM mode

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	27.70	0.589	-15.90	43.60	VERTICAL	PASSED
661 / 1880.0	29.60	0.912	-14.40	44.00	HORIZONTAL	PASSED
810 / 1909.8	29.10	0.813	-15.90	45.00	HORIZONTAL	PASSED

GPRS mode, 2 TX Slots

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	25.20	0.331	-18.70	43.90	HORIZONTAL	PASSED
661 / 1880.0	26.40	0.437	-17.60	44.00	HORIZONTAL	PASSED
810 / 1909.8	25.50	0.355	-19.50	45.00	HORIZONTAL	PASSED

GPRS mode, 3 TX Slot

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	23.60	0.229	-20.30	43.90	HORIZONTAL	PASSED
661 / 1880.0	25.50	0.355	-18.50	44.00	HORIZONTAL	PASSED
810 / 1909.8	23.80	0.240	-21.20	45.00	HORIZONTAL	PASSED

EGPRS mode, 2 TX Slot

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	23.40	0.219	-20.50	43.90	HORIZONTAL	PASSED
661 / 1880.0	24.40	0.275	-19.60	44.00	HORIZONTAL	PASSED
810 / 1909.8	23.50	0.224	-21.50	45.00	HORIZONTAL	PASSED

Slide Closed:

GSM mode

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512 / 1850.2	28.60	0.724	-15.00	43.60	VERTICAL	PASSED
661 / 1880.0	29.60	0.912	-14.40	44.00	HORIZONTAL	PASSED
810 / 1909.8	30.00	1.000	-15.00	45.00	HORIZONTAL	PASSED

GPRS mode, 2 TX Slots

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512 / 1850.2	26.30	0.427	-17.60	43.90	HORIZONTAL	PASSED
661 / 1880.0	27.40	0.550	-16.60	44.00	HORIZONTAL	PASSED
810 / 1909.8	27.60	0.575	-17.40	45.00	HORIZONTAL	PASSED

GPRS mode, 3 TX Slot

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512 / 1850.2	25.60	0.363	-18.30	43.90	HORIZONTAL	PASSED
661 / 1880.0	25.80	0.380	-18.20	44.00	HORIZONTAL	PASSED
810 / 1909.8	26.00	0.398	-19.00	45.00	HORIZONTAL	PASSED

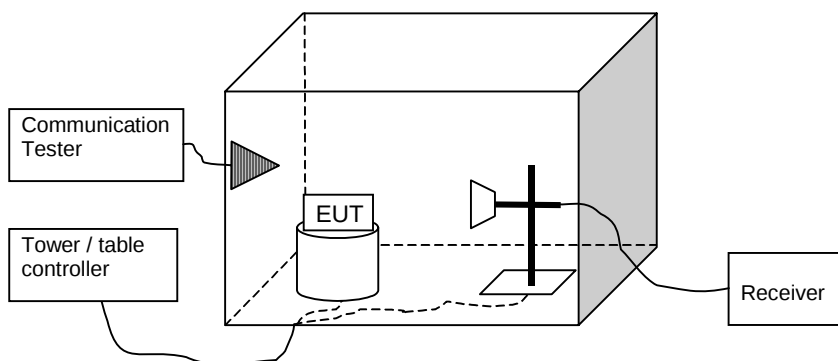
EGPRS mode, 2 TX Slot

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512 / 1850.2	24.30	0.269	-19.60	43.90	HORIZONTAL	PASSED
661 / 1880.0	26.00	0.398	-18.00	44.00	HORIZONTAL	PASSED
810 / 1909.8	25.30	0.339	-19.70	45.00	HORIZONTAL	PASSED

3. Band edge compliance (FCC 24.238(a), RSS-133 6.3)

EUT with DUT number	RM-233, DUT 27322
Accessories with DUT numbers	BL-4U, DUT 29210; AC-6E, DUT 27210
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 44 / 100.7
Date of measurements	03.08.2007
Measured by	Kalle Hannila / Ruben Hansen

3.1. Test setup



3.2. Test method and limit

The measurement is made according to FCC rules part 24 and IC standard RSS-133.

Limits for band edge compliance measurements

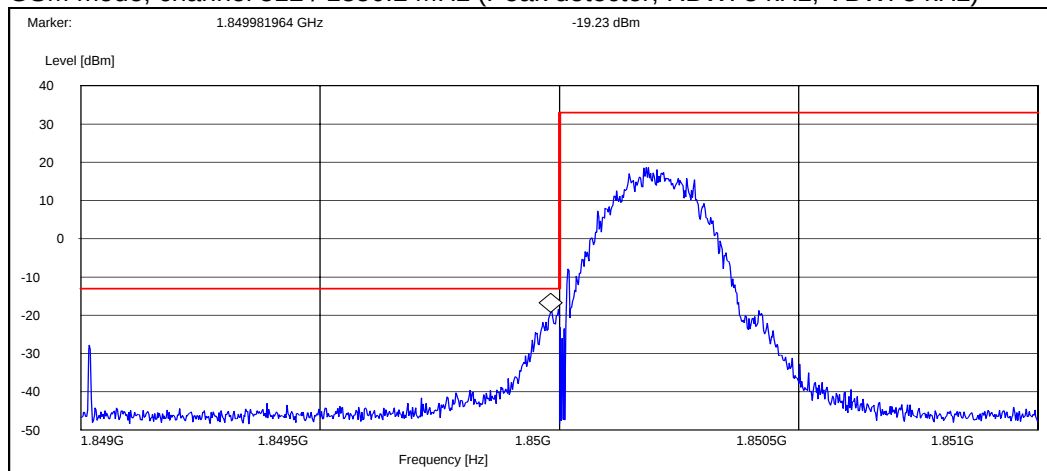
Operation band	Frequency range [MHz]	Limit [dBm]
GSM 1900	Below 1850 and above 1910	-13

3.3. GSM 1900 Test results

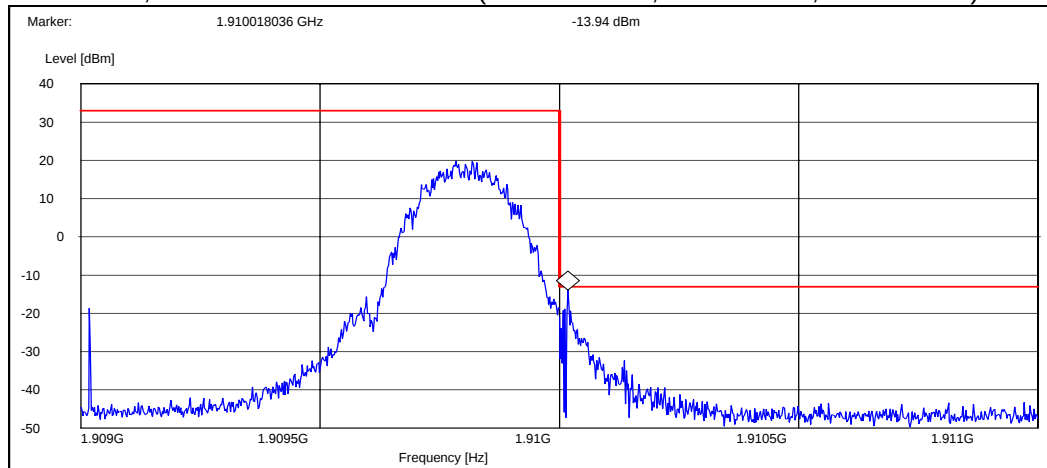
Operation mode (TX on)	Channel / f_c [MHz]	Level [dBm]
GSM	512 / 1850.2	-19.23
GSM	810 / 1909.8	-13.94
EGPRS	512 / 1850.2	-25.38
EGPRS	810 / 1909.8	-16.58

Slide Open:

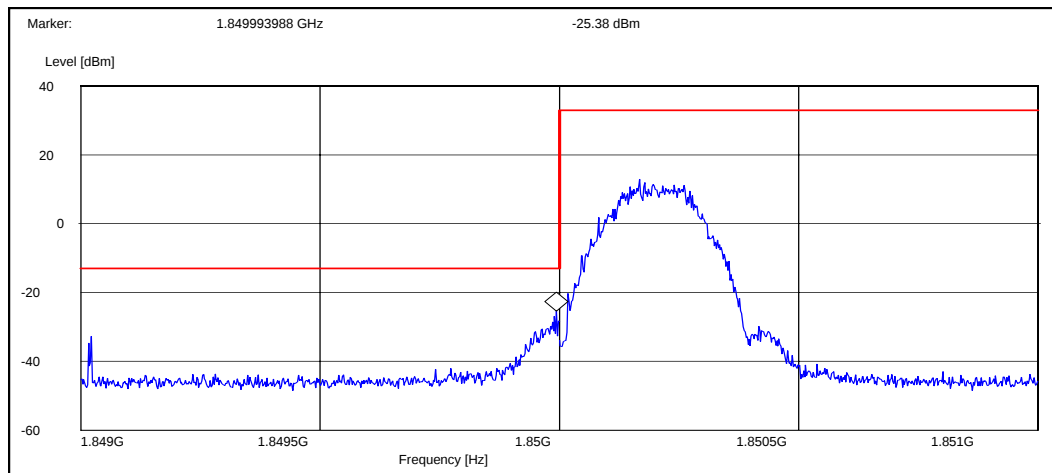
GSM mode, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



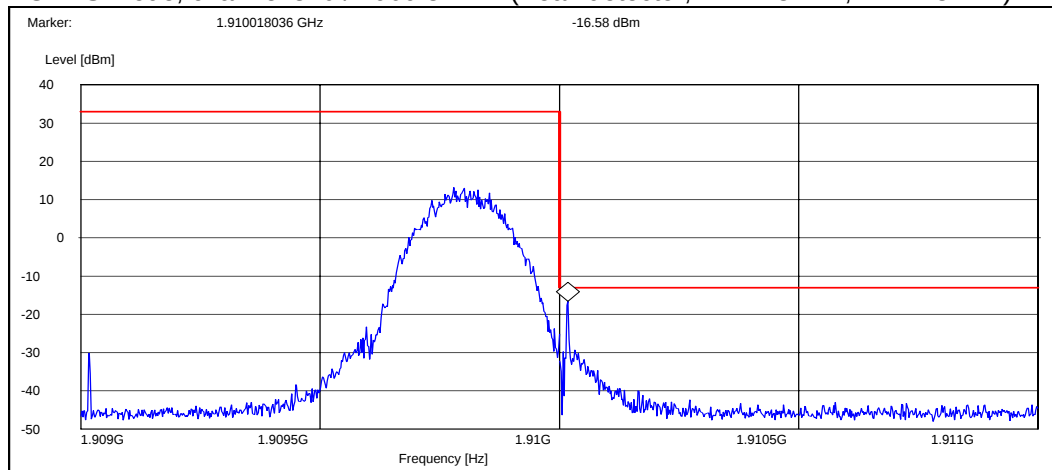
GSM mode, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



EGPRS mode, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



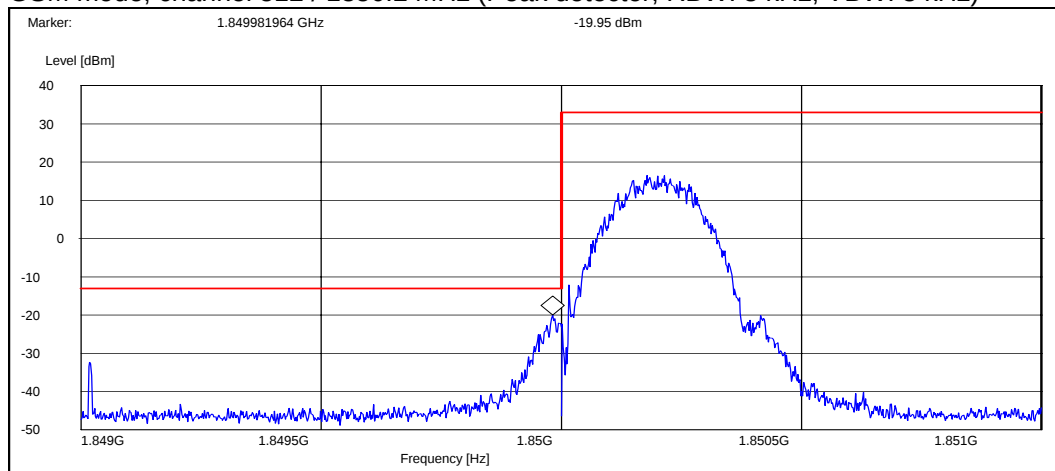
EGPRS mode, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



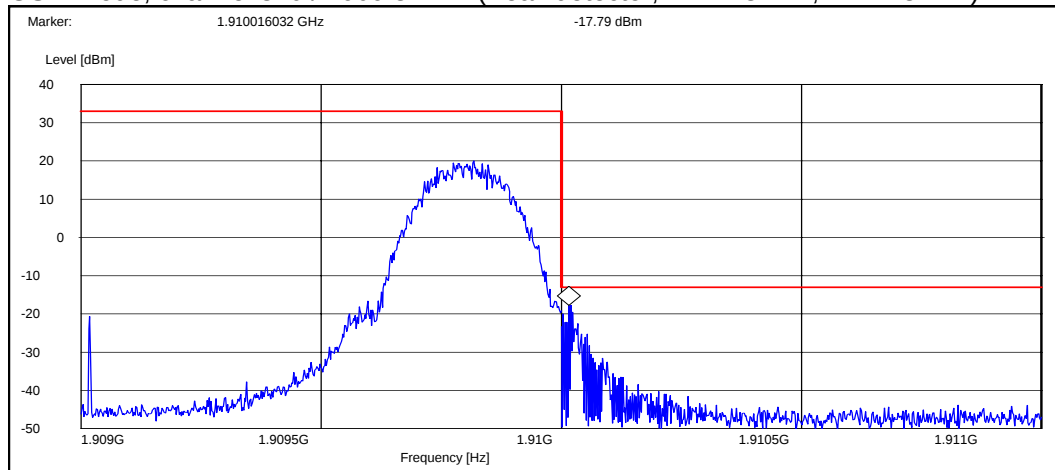
Operation mode (TX on)	Channel / f_c [MHz]	Level [dBm]
GSM	512 / 1850.2	-19.95
GSM	810 / 1909.8	-17.79
EGPRS	512 / 1850.2	-26.78
EGPRS	810 / 1909.8	-16.44

Slide Closed:

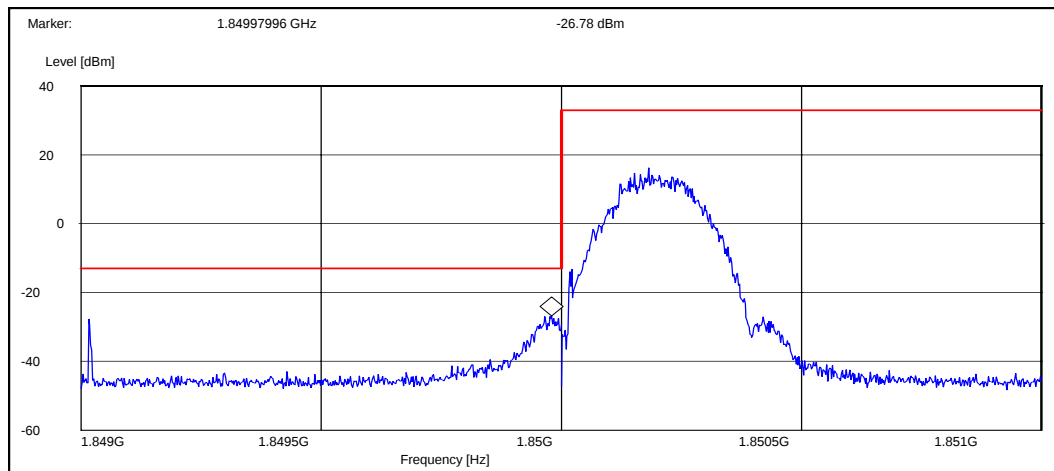
GSM mode, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



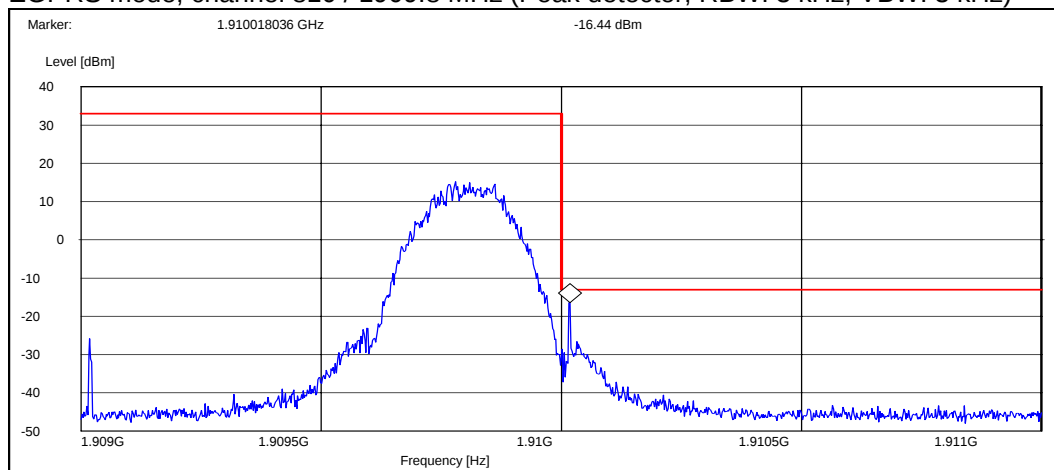
GSM mode, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



EGPRS mode, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



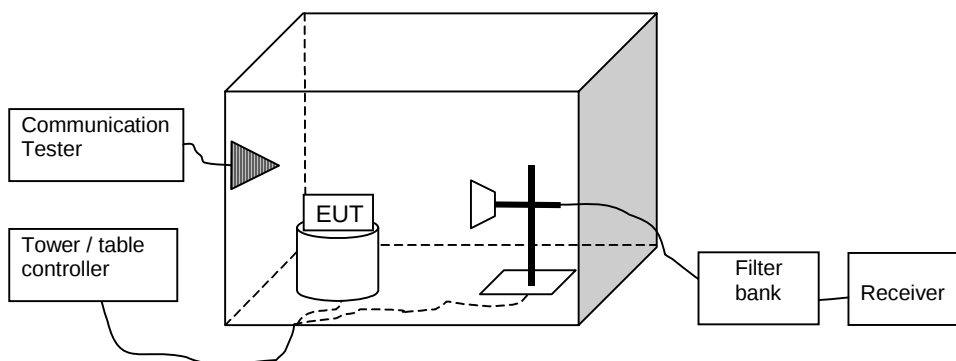
EGPRS mode, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



4. Spurious radiated emissions (FCC §24.238(a), §2.1053, RSS-133 6.3)

EUT with DUT number	RM-233, DUT 27322
Accessories with DUT numbers	BL-4U, DUT 29210; AC-6E, DUT 27210
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Phone tested slide open mode.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 45 / 100.4
Date of measurements	01.08.2007-02.08.2007
Measured by	Kalle Hannila / Ruben Hansen

4.1. Test setup



4.2. Test method and limit

The measurement is made according to TIA-603-B-2002 as follows:

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

The substitution method is used. Substitution values at each frequencies are measured beforehand and saved to the test software.

The substitution corrections are obtained as described below:

$$A_{SUBST} = P_{SUBST_TX} - P_{SUBST_RX} - L_{SUBST_CABLES} + G_{SUBST_TX_ANT}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain. P_{SUBST_TX} is signal generator level, P_{SUBST_RX} is receiver level, L_{SUBST_CABLES} is cable losses including both TX and RX cables and $G_{SUBST_TX_ANT}$ is substitution antenna gain.

The measurement results are obtained as described below:

$$P [dBm] = P_{MEAS} + A_{TOT}$$

Where P_{MEAS} is receiver reading in dBm and A_{TOT} is total correction factor including cable loss, preamplifier gain and substitution correction ($A_{TOT} = L_{CABLES} - G_{PREAMP} + A_{SUBST}$).

Limits for spurious radiated emissions measurements

Operation band	Frequency range [MHz]	Limit [dBm]
WCDMA 1900	30 - 18000	-13

4.3. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1934.202004	-50.00	0.01000	-58.10	8.10	VERTICAL	PASSED
3760.023046	-36.80	0.20893	-45.40	8.60	HORIZONTAL	PASSED
5640.282565	-31.40	0.72444	-43.50	12.10	VERTICAL	PASSED
7520.042084	-42.30	0.05888	-62.10	19.80	VERTICAL	PASSED

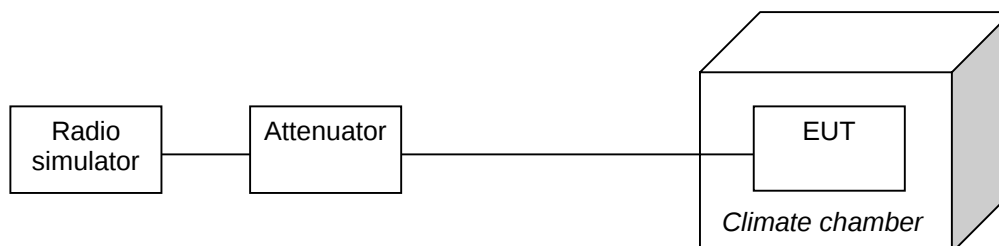
EGPRS mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1934.202004	-47.60	0.01738	-55.70	8.10	VERTICAL	PASSED
3760.023046	-35.50	0.28184	-44.10	8.60	HORIZONTAL	PASSED
5639.782565	-30.10	0.97724	-42.30	12.20	VERTICAL	PASSED
7520.042084	-42.80	0.05248	-62.60	19.80	VERTICAL	PASSED

5. Frequency stability, temperature variation (FCC §2.1055(a), RSS-133 7)

EUT with DUT number	RM-233 dut 27212, BL-4U dut 27213
Accessories with DUT numbers	HS-82 dut 27240
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23.5 / 49.0 102.04
Date of measurements	06-08-2007
Measured by	Jan Engelbrechtsen

5.1. Test setup



5.2. Test method and limit

The measurement is made according to FCC rules part 24 and IC standard RSS-133 as follows:

- The climate chamber temperature is set to the maximum value and the temperature is allowed to stabilize.
- The EUT is placed in the chamber.
- The EUT is set in idle mode for 15 minutes.
- The EUT is set to transmit.
- The transmit frequency error was measured immediately.
- The steps c - e were repeated for each temperature.

Limits for frequency stability, temperature variation measurements

Frequency deviation [ppm]
± 2.5

5.3. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

Temperature [°C]	Deviation [Hz]	Deviation [ppm]
50	-31	-0.0165
40	-35	-0.0186
30	-36	-0.0191
20	-41	-0.0218
10	-42	-0.0223
0	-30	-0.0160
-10	-44	-0.0234
-20	-47	-0.0250

Note: phone switched off at -30°C

6. Test Equipment

6.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
13037	Power Supply 0-15V 10A	EA3012	LP Instruments	15C, 15B
13513	Pulse Limiter 9KHz-30MHz	ESH3Z2	Rohde&Schwarz	15C, 15B
13666	EMI Test Reciever 9KHz-2,5GHz	ESPC	Rohde&Schwarz	15C, 15B
13935	Two Lines Artificial Mains Network	ESH3-Z5	Rohde&Schwarz	15C, 15B
16995	Directional Coupler 20dB 0,5-2,0 GHz SMA Conn.	1538RA-20	Weinschel	15C, 15B
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15C, 15B
19171	Universal Radio Communication Tester	CMU200	Rohde&Schwarz	15C, 15B
11386	System DC Power Supply	HP6632A	Hewlett Packard	22/24, 15C, 15B
19678	Spectrum Analyzer 26 GHz	FSP	Rohde&Schwarz	22/24, 15C, 15B
16601	Universal Radio Communication Tester	CMU200	Rohde&Schwarz	22/24, 15C, 15B
19625	Vötsch Climatic Chamber	VT4002EMC	Vötsch	22/24, 15C, 15B
13357	Rohde & Schwartz Signal Generator	SMP02	Rohde&Schwarz	22/24, 15C, 15B

6.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
18416	Universal Radio Communication Tester	CMU200	Rohde&Schwarz	22/24, 15C, 15B
	Programmable Relay Switching System	-----	Pickering	22/24, 15C, 15B
15742	Programmable Relay Switching System	-----	Pickering	22/24, 15C, 15B
14020	Power Supply Module Relay Switching System 45W	10-910-002	Pickering	22/24, 15C, 15B
15743	Power Supply Module Relay Switching System 50W	10-910L-001	Pickering	22/24, 15C, 15B
16490	RS-232/IEEE-488.2 Interface	10-921-001	Pickering	22/24, 15C, 15B
	RS-232/IEEE-488.2 Interface	10-921-001	Pickering	22/24, 15C, 15B
20078	Relay 2x6 Chnl μ Wave Mux	10-785B-522	Pickering	22/24, 15C, 15B
14021	Relay Dual 6 Chnl μ Wave Mux	10-785-522		22/24, 15C, 15B
	Relay Dual 6 Chnl μ Wave Mux	10-785-522		22/24, 15C, 15B
17644	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24, 15C, 15B
16948	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24, 15C, 15B
16949	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24, 15C, 15B
18792	Multi Device Controller	2090	ETS-EMCO	22/24, 15C, 15B
14963	RF Preampifier 100MHz-4GHz (Metal Chassis)	AFS3-00100400	Miteq/NMP Cph	22/24, 15C, 15B
18861	EMI Test Receiver 20Hz-26,5GHz	ESI	Rohde&Schwarz	22/24, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
18860	Ultra Broadband Antenna Ultralog 30-3000MHz	HL562	Rohde&Schwarz	22/24, 15C, 15B
19830	Ultra Broadband Antenna Ultralog 30-3000MHz	HL562	Rohde&Schwarz	22/24, 15C, 15B
18773	Shielded Chamber	RFD-100	ETS-Lindgren	22/24, 15C, 15B
18774	Shielded Chamber	RFSD-F/A-100	ETS-Lindgren	22/24, 15C, 15B
19151	High Pass Filter 3GHz WHK3.0/18G-10ss	WHJS3000-10SS	Wainwright	22/24, 15C, 15B
13937	Ultra Stable Notch Filter 850MHz	WRCA902.4-0.2/40-6SS	Wainwright Instruments	22/24, 15C, 15B
13936	Ultra Stable Notch Filter 1747,5MHz	WRCD1747.5-0.2/40- 10SS	Wainwright Instruments	22/24, 15C, 15B
13917	Highpass Filter 1000-3000MHz 50OHM SMA Conn	WHKS1000-10SS	Wainwright Instruments	22/24, 15C, 15B
14188	Ultra Stable Notch Filter 902,4MHz	WRCA902.4-0.2/40-6SS	Wainwright	22/24, 15C, 15B
14187	Ultra Stable Notch Filter 1747,5MHz	WRCD1747.5-0.2/40- 10SS	Wainwright	22/24, 15C, 15B
16633	Ultra Stable Notch Filter 1880,0MHz	WRCD1880.0-0.2/40- 10SS	Wainwright	22/24, 15C, 15B
19587	BT/WLAN Band Reject Filter	WRCG2400/2483- 2390/2493-35/10SS	Wainwright	22/24, 15C, 15B
	WDCMA Band 4 filter	WRCG1737/1743- 1733/1747-40/6SS	Wainwright	22/24, 15C, 15B
	WDCMA Band 5&6 filter	WRCG832/83/-825/845- 40/5SS	Wainwright	22/24, 15C, 15B
	WDCMA Band 8 filter	WRCG894.6/900.6- 890.6/904.6-40/80SS	Wainwright	22/24, 15C, 15B
18323	Band reject filter 1947-1953MHz 40dB	WRCG1947/1953- 1940/1960-40/6SS	Wainwright	22/24, 15C, 15B
20031	Double Ridged Broadband Horn	BBHA 9120 D	SCHWARZBECK	22/24, 15C, 15B
15190	Infra Red Remote Control Unit	4630	Emco	22/24, 15C, 15B
14993	EMI Test Receiver 9KHz- 2750MHz	ESCS30	Rohde&Schwarz	22/24, 15C, 15B
15191	Turntable Contoller Unit	G-800SDX	YAESU	22/24, 15C, 15B
14900	Antenna Controller	HD100	HD GmbH	22/24, 15C, 15B
15105	Attenuator 30dB DC-1000MHz 50 Ohm Nf - Nm	NAT-30	Mini-Circuits	22/24, 15C, 15B
13302	Spectrum Analyzer 9KHz- 12.8GHz	HP8596E	Hewlett Packard	22/24, 15C, 15B
11584	Spectrum analyzer 50Hz- 6,5GHz	HP8561B	Hewlett Packard	22/24, 15C, 15B
13134	Tracking generator	HP85645A	Hewlett Packard	22/24, 15C, 15B
19374	Resonant Dipole Antenna 850MHz SMA m Conn.	-----	NMP Cph	22/24, 15C, 15B
19375	Resonant Dipole Antenna 1900MHz SMA m Conn.	-----	NMP Cph	22/24, 15C, 15B
11487	Network analyzer 300KHz- 3,0GHz	HP8753A	Hewlett Packard	22/24, 15C, 15B
14807	S - Parameter Test Set 300KHz- 6GHz	HP85047A	Hewlett Packard	22/24, 15C, 15B
17277	Multimeter Digital 6 1/2 Digit	AT34401A	Agilent Technologies	22/24, 15C, 15B